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Towards a new training methodology

Elite dance and sport attract highly motivated, perfectionistic individuals to environments that are highly competitive and physically demanding[1, 2]. At an elite level both sport and dance performances can speak directly to the emotions of the observer through their physical movement and highly trained bodies. While dancers have been referred to as the embodiment of artist and athlete[3], dance is not generally considered a sport and as such, the sharing of knowledge between dance and sport is rarely exploited to the mutual benefit of sport and dance participants. While philosophical debate may continue regarding the artistic side of dance that may not be present in sport, or the lack of competition in dance that is traditionally seen in sports but not in dance, in the context of physical activity and resultant impact on health, dance should be considered an equal and afforded the same attention to its effect on the body as seen in sporting disciplines[4].

How these bodies are trained to fulfill the different performance goals differ enormously, though again their similarities within their training paradigms with long hours of training from an early age, tradition and the coach/teacher guru playing fundamental roles. What separates the two disciplines is that dance training is nearly totally focused on skill development[5] to the detriment of physical fitness[6] and sport is the opposite[7, 8]. Though this seems to be a sweeping generalization and exceptions can easily be found due to the umbrella terms of dance and sport encompassing very diverse forms, on the whole the basic training environment for the disciplines have very different emphasis, with dance class the focus is technique enhancement whilst for sport, development of the sport-specific physical attributes of the participants. These different approaches manifest themselves at the elite level with dancers demonstrating excellent economy of movement due to their high skill level, though this means that the long daily dance schedules have no beneficial effect on their underlying fitness levels. Elite sportspeople in comparison have highly developed physical fitness levels accompanied by less comparably developed skill levels.

The organisation and planning of training are also disparate. Sport has set itself within a very structured training paradigm (periodisation)[9], which is focused on peaking for specific events, often only 3-4 events a year in individual sports or up to 40 matches a year for soccer clubs (though not all players will play all games as clubs will prioritize players around key competitions). Dance's model is totally focused on specific skill development (rehearsals) for their performances due to a performance schedule that can encompass 215 performances a year[10]. This has resulted in comparatively high injury levels in dance. Initial comparison between sport and ballet has reported that professional ballet dancers experienced a much lower overall incidence of injury (4.4/1000 hrs)[11] than has been reported in many competitive sports such as rugby union (17/1000hrs)[12] and soccer (8.5/1000hrs)[13] where aggressive physical contact and collisions with other competitors are frequent and/or part of the sport. Professional ballet dancers though have reported higher injury incidences during class and rehearsal (female: 3.1/1000hrs; male: 4.3/1000hrs)[11] than those reported in sports' training sessions; international soccer (28/1000hrs)[13] and elite rugby (2.0/1000hrs)[12]. The trend is reversed during competition/performance with the dance injury rate remaining reasonably similar (female: 4.4/1000hrs; male: 5.2/1000hrs)[11] whilst rugby ranged between 91-218/1000hrs[12] and soccer between 23-42/1000hrs[13]. Further to this, dancers are subject to far greater exposure periods increasing their risk to injury, demonstrated by an average of 6.8 injuries per year per dancer observed in one dance study, in comparison to the 1.9 injuries seen in professional rugby and 2.1-5.4 seen in professional football.

The above evidence suggests that the dance training environment (class and rehearsal) needs to be reviewed in a manner that does not compromise skill levels. It is always easier to add other complementary sessions to the time table but that will lead to overtraining the dancer[14], which also has the increased risk of raising injury incidence[15]. The solution is a focus on "quality" rather than "quantity" within training; this is achieved by programming rest and/or reduced training load days into the weekly schedule and by monitoring the overall daily, weekly and monthly training loads[16]. As dance is a high skill activity, fatigue has an enormous detrimental effect on skill acquisition[17] when the dancer is exposed to numerous classes a day and each class is at maximum workload (high intensity and time) the dancer nor

teacher will get the optimum learning experience in the latter classes. Therefore the intensities of the classes need to vary throughout the day, with high and low workloads, to allow the dancer to rest and recovery so that in the last class of the day the dancer is in a state to learn without being overly fatigued. This does not mean that low workload/intensity classes are second-tier but that the technique to be learnt is restricted to a short jump sequence and no transitional movement beyond three steps. Workload isn't there to stifle artistry but to enhance the dancer's overall global skill acquisition in multiple genres. An example of the different class intensities can be found in table 1.

Table 1: An example of dance class descriptors for class intensity levels.

Intensity	**Description**
3	**Barre:** short exercises, simple co-ordination. **Centre work:** moving exercises around body without moving through space e.g. pirouettes from 5th or petite allegro on two legs **Travelling:** should only be there for the purpose to explain and discover the physical action of shifting the weight e.g. balancé de coté or chainé turns
5	**Barre:** whole barre more fluid; three exercises to be connected. e.g. tendus connected to degagé, changing sides while pianist continues. **Centre work:** introducing movement in the space and whole section broken into 3-4 parts. e.g. pirouettes connected to balancé **Travelling:** diagonals with relevé and small jumps (petit allegro) – big jumps can be used if accompanied with longer recovery periods and focus on co-ordination e.g. glissade et assemble sissone simple
8	**Barre:** length and movement co-ordination to be more challenging. e.g. connected plié tendé degage **Centre work:** longer combinations, highlighting the change in direction and dynamics. e.g. balancé connected balances to pirouettes and small jumps at the end , or petite allegro from two legs to one, tempe lie or temp levé **Travelling:** increasing the complexity of combinations utilising big jumps e.g. grand allegro with a big run to change sides
10	**Barre:** 25 minute intense barre (no rest periods). e.g. prepared from intensity 5 and then going non-stop with frappé as the first rest place. **Centre work:** further development of level 8 with longer combinations and greater sense of dynamic change. e.g. petite allegro of 32 counts on one side **Travelling:** increasing the complexity of combinations utilising big jumps with less recovery time and more emphasis on dynamics

A dance class or rehearsal's training load is determined by "work intensity x time"; where time is the length of the class and intensity can be determined by either rate of perceived exertion (RPE), as suggested above, or heart rate. This means that each class and rehearsal has a workload score and from these daily, weekly and monthly overall workloads can be planned and monitored (Figure 1). The body is a reactive entity and adapts when exposed to new stresses, in this instance workload, but if these stresses increase too rapidly, more than 10% a week for an extended period of time, the adaptation becomes maladaptive and the body prone to injury[18].

Figure 1: Example of individual and daily workloads

Activity	**Ballet**	**Project**	**Pilates**	**Ballet**	**Contemporary**
Time	1	1.5	1	1	1.5
Intensity	5	3	2	8	8
Workload	5	4.5	2	8	12
Activity	**Contemporary**	**Contemporary**	**Pilates**	**Cunningham**	**Academic**
Time	1.5	1.5	1	1.5	1.5
Intensity	8	5	2	5	1
Workload	12	7.5	2	7.5	1.5
Activity	**Conditioning**	**Music**	**Ballet**	**Release**	**Duet**
Time	1	1	1.5	1.5	1.5
Intensity	8	1	5	3	5
Workload	8	1	7.5	4.5	7.5
Activity					
	Rep	**Duet**	**Rep**	**Improvisation**	**Solos**
Time	1.5	2	1.5	1	1
Intensity	5	4	5	3	3
Workload	7.5	8	7.5	3	3
Activity	**Solos**	**Solo**	**Solo**	**Duet**	
Time	1	1	1	2	
Intensity	3	3	3	4	
Workload	3	3	3	8	
Activity	**Duet**		**Duet**	**Solo**	
Time	2		2	1.5	

Intensity	5		5	3	
Workload	10		10	4.5	
Total	**45.5**	**24**	**32**	**35.5**	**24**

The variation in daily loading can be seen in Fig. 1 which again allows "recovery" days to be planned into the schedule. Training theory within the exercise sciences has shown the benefits of this planning method[19] and have also incorporated the use of "unloading" weeks. This is demonstrated in Fig. 2 when a light intensity week is preceded by 4-6 weeks of progressively intensive daily and weekly workloads. The unloading week allows the body to go through a process called "compensation"[20] which is when the muscles adapt at a greater rate than if the training intensity had continued, a similar phenomenon is seen with psychological states[21]. The unloading week is then followed by a return to a similar workload intensity as experienced prior to it so that physical detraining does not occur.

Figure 2: Progressively increasing training weeks followed by an unloading week (wk 8).

The role of the artistic director or head of department is a complex one as they not only have to plan the timetable according to dancer teachers'/rehearsal directors' availability but also decide on the work intensity of each class and rehearsal against the overall goals of that term. Figure 1 provides an example of the art form of planning workloads across the week that allow each technique genre to have a high intensity class. If you follow the contemporary class it has an eight on Monday and Friday but a five on the Tuesday. This is to allow Tuesday to be a less intensive workload day as the Monday, Wednesday and Thursday are high workload days. It could be that the artistic director or head of department has decided that students need to focus on an up-coming dance performance and therefore using the week schedule in Figure 1, the rep, duet and solo rehearsals take precedence, and therefore the intensity of these sessions increase. The technique classes would have their intensity decreased to 3-5 so that they support the rehearsals but not fatigue the students prior to their commencement.

The hardest aspect of this system is getting all the teachers and rehearsal directors to adhere to it. It does not matter whether it is dance or sport, each teacher or coach want to give the best session they can, often to demonstrate how good they are (especially for freelancers); this frequently results in a hard class or rehearsal irrespective of the other activities the dancers are doing that day. The use of a technique intensity bible (Table 1) provides context for the teachers to plan their class against. Fundamental to the whole process is communication between the whole team so that they understand the goals of that term or season, how these are to be achieved on a weekly basis and the role they will play in it. This requires the timetable and workloads to be planned in advance so that the teachers have time to plan the development of their sessions to meet their specific goals. The whole plan needs to be fluid enough to be able to react to any unforeseen circumstances, for instance if students are not advancing as fast as needed in a specific technique that is fundamental to a summer performance, then the artistic director needs to be able to maintain the focus on that technique for a longer period, which will have an effect on other technique classes that may need to be maintained at a lower workload for a longer period of time. This highlights the need for regular communication between all the involved parties so that the dancers do not become overtrained and fatigued which reduces that chances that the goals will be achieved.

In summary, this article has introduced a new training method for dancers that has a number of fundamental principles, the first of these is quality of training is more important than hours danced (quality vs. quantity). Leading on from this is that optimal learning occurs best when dancers are not tired and therefore "Rest" is a fundamental training strategy. The increase in workload (hours dancing x intensity of dancing) needs to be progressive to allow the body to adapt and reduce the risk of injury. For this to occur and still maintain the quality of training not all classes/rehearsals can be treated as equal, some will take precedent depending on the goals of that day/week/month/term. For this training method to work communication and team work is vital to success and the plan has to be adaptive and responsive to react to the dancers' ability to cope and achieve the goals set out by the artistic director.

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